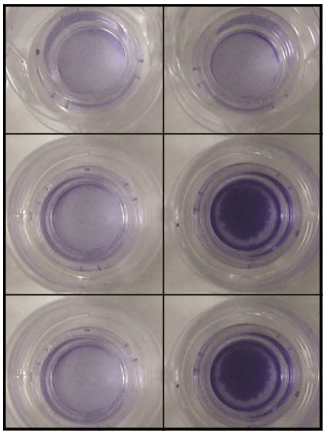
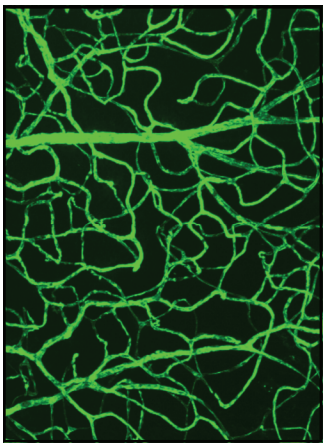
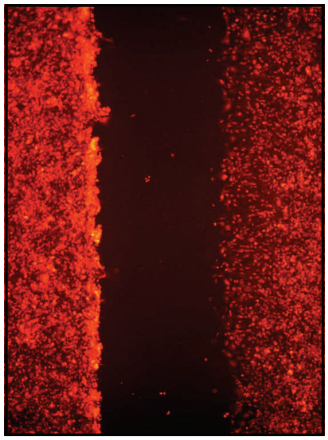
Cell Adhesion, Migration, and Invasion Assays







Choose your Cell-Based Assays			
	Cellular Activity	**Assay Format**	**Detection Method**
Cell Adhesion (p. 2-3)	Adhesion to extracellular matrix	48-Well Plate	Colorimetric
			Fluorometric
	Adhesion to endothelium or epithelium	96-Well Plate	Fluorometric
Cell Migration (p. 4-7)	Random migration	24-Well Gap Closure	Microscopy
	Migration toward a chemoattractant (Chemotaxis)	24-Well Boyden Chamber	Colorimetric
			Fluorometric
		96-Well Boyden Chamber	Fluorometric
	Migration toward immobilized ECM (Haptotaxis)	24-Well Boyden Chamber	Colorimetric
			Fluorometric
	Migration through endothelium toward a chemoattractant (Transmigration)	24-Well Boyden Chamber	Fluorometric
Cell Invasion (p. 6-7)	Invasion through extracellular matrix	24-Well Boyden Chamber	Colorimetric
			Fluorometric
		96-Well Boyden Chamber	Fluorometric
Wound Healing (p. 8)	Migration across a wound field/gap	24-well Gap Closure	Light Microscopy

CELL BIOLABS, INC.
Creating Solutions for Life Science Research

Measure cell adhesion to extracellular matrix proteins or to endothelium, in static or shear flow environments

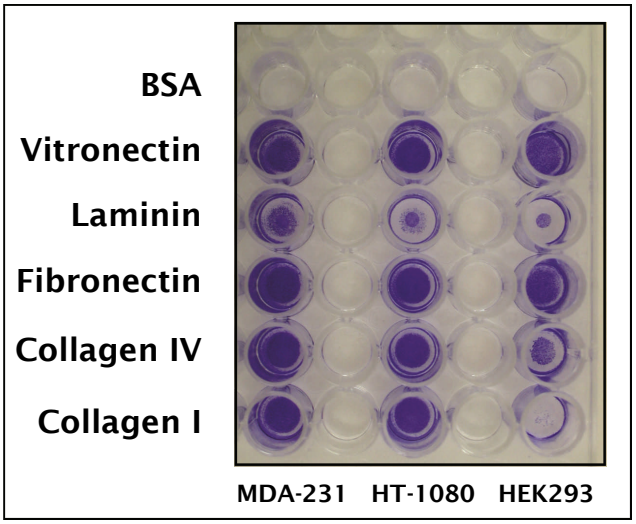
Cell Adhesion Assays

Cell adhesion is a complex mechanism involved in a variety of processes including cell migration, cell invasion, embryogenesis, wound healing, and tissue remodeling.

Cells can adhere to various proteins in the extracellular matrix (ECM) where they form complexes with cytoskeletal components, or they can adhere to the endothelium or epithelium.

Our CytoSelect™ Cell Adhesion Assays are available to quantify these interactions in two formats:

- **Static Assays**: Our 48-Well and 96-Well Adhesion Assays provide a high-throughput *in vitro* adhesion model
- **Shear Stress Assays**: Our 8-Channel Microfluidic Biochips allow you to mimic the shear stresses and flow rates found in *in vivo*



Staining of Serum-Starved Cells from 3 Different Cell Lines Adhering to Various ECM Proteins.

48-Well ECM Cell Adhesion Assays

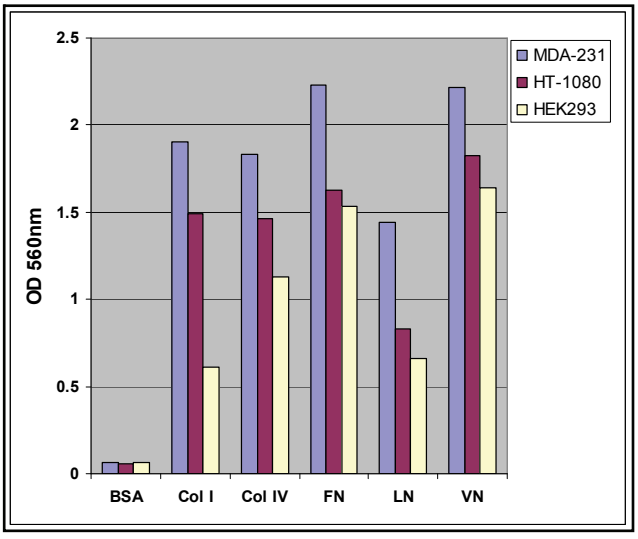
The CytoSelect™ ECM Cell Adhesion Assays allow you to evaluate and quantify cell adhesion to a variety of ECM proteins:

- Collagen I
- Collagen IV
- Fibrinogen
- Fibronectin
- Laminin

Each one of our complete assay kits contains a 48-well plate precoated with one of these proteins along with a detection dye suitable for either colorimetric or fluorometric detection.

Alternatively, you may choose our ECM Array Adhesion Assay. This is a popular method to study the adhesion of cells to a variety of extracellular matrix proteins. In this kit, each horizontal row of the 48-well plate is precoated with a different one of the five proteins listed above, with the final row containing BSA as a negative control.

The CytoSelect™ ECM Array Adhesion Assay is available with either colorimetric or fluorometric detection.



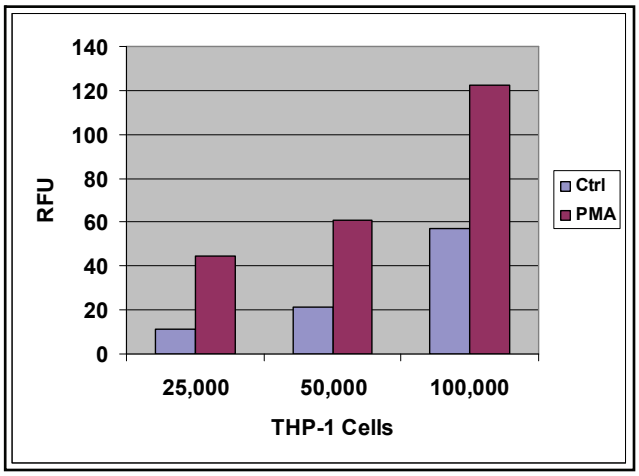
Colorimetric Quantitation of Serum-Starved Cells from 3 Different Cell Lines Adhering to Various ECM Proteins.

96-Well Endothelium & Epithelium Adhesion Assays

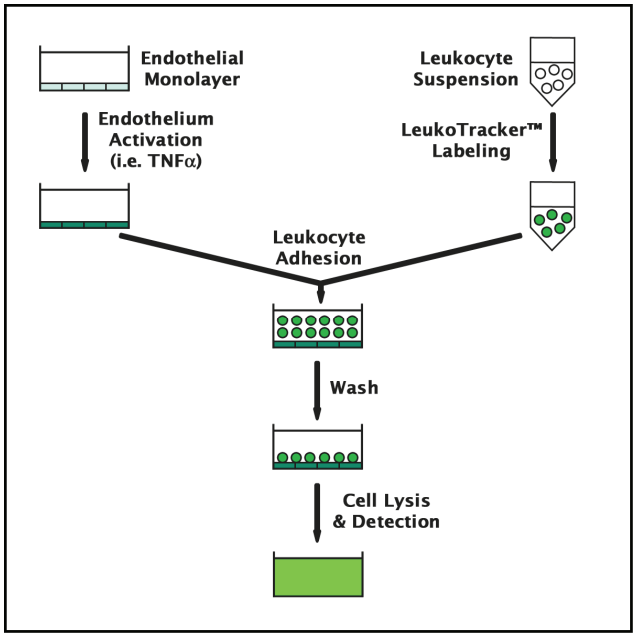
Interactions of leukocytes and tumor cells with vascular endothelium consist of a cascade of processes including the firm adhesion of the cells to endothelial cell adhesion molecules. The CytoSelect™ Endothelium Adhesion Assays provide a robust system for the quantitative determination of interactions between leukocytes or tumor cells and the endothelium.

Interactions between leukocytes and the epithelium may be measured using the CytoSelect™ Leukocyte-Epithelium Adhesion Assay.

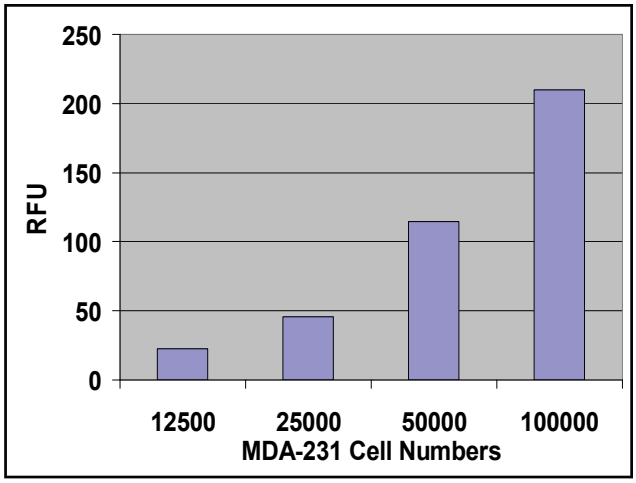
With all of our Endothelium and Epithelium Adhesion Assays, adherent cells may be quantified on a fluorescence plate reader.

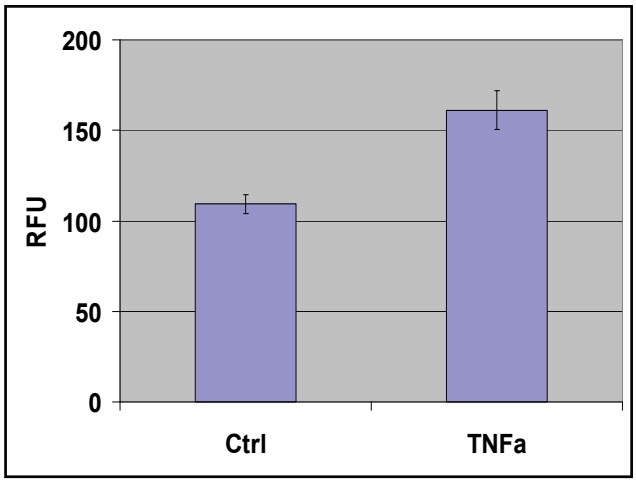


Human Monocytic THP-1 Adhesion to HUVEC Monolayer using the CytoSelect™ Leukocyte-Endothelium Adhesion Assay.



Assay Principle for the CytoSelect™ Leukocyte-Endothelium Adhesion Assay.





Human Breast Cancer MDA-231 Adhesion to HUVEC Monolayer at Various Cell Concentrations (top) and with or without TNFα (bottom) using the CytoSelect™ Tumor-Endothelium Adhesion Assay.

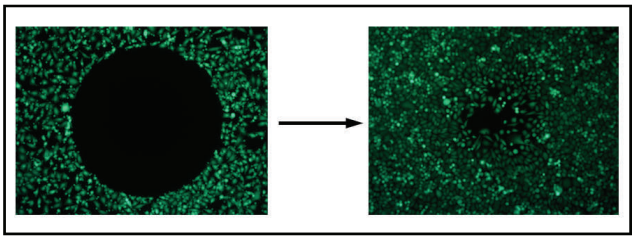
Easily quantify migratory or invasive cells without manual cell counting

Cell Migration and Invasion Assays

Cell migration and invasion are highly integrated, multi-step processes and play important roles in the progression of various diseases including cancer, atherosclerosis and arthritis.

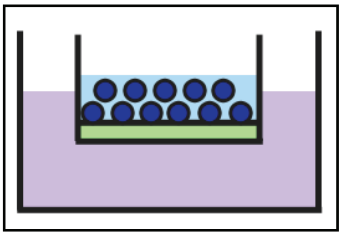
Cell Biolabs offers cell migration assays in two distinct formats:

- 2D Gap Closure Assays create a defined area on a two-dimensional surface, such as the bottom of a cell culture plate well, across which migratory cells may move. Cell migration may be monitored at endpoint or in real time by microscopy. Analysis is qualitative, but various software programs are available to quantify cell migration.



Cells seeded in the Radius™ 24-Well Cell Migration Assay. Left: Before migration begins. Right: after 24 hours.

- Boyden Chamber Assays consist of a cell culture insert nested in the well of a cell culture plate. The bottom of the insert contains a membrane with a specific pore size. Cells are seeded in the top of the insert and move through the membrane pores to the underside.



In a Boyden Chamber, cells are placed in the upper chamber and a chemoattractant is placed in the lower chamber.

There are distinct advantages for each assay format. Depending on your research goals, one format may be more suitable than the other. Use the following table to determine the best format for you. You can find more detail on both of these formats on the next three pages.

Cell Migration Assay Format Selection Guide

	2D Gap Closure Assays	Boyden Chamber Assays
Analysis	Qualitative or Quantitative	Quantitative
Detection Time	Endpoint or Real Time	Endpoint
Detection Method	Microscopy	Plate Reader
Cell Compatibility	Any	Choose membrane pore size to match cell type
Permits Chemoattractant Gradient	No	Yes
Sensitivity	Good	Fair
Adaptability to Automation	Good	Poor

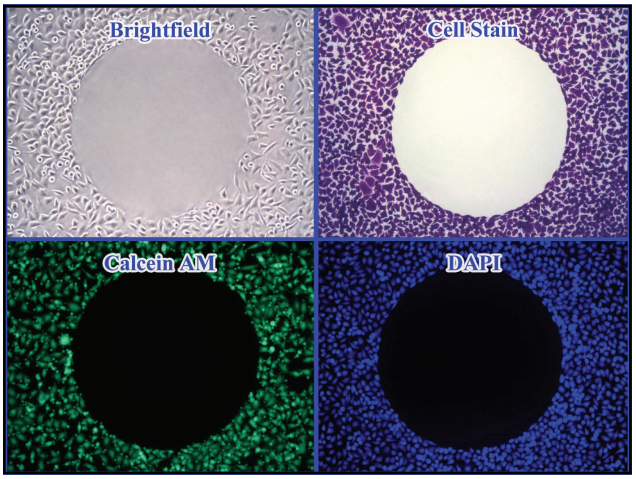
2D Gap Closure Cell Migration Assays

Our Radius™ Cell Migration Assays provide a unique alternative to conventional cell migration assays using the Boyden Chamber. The gap closure format allows you to monitor cell migration at endpoint or in real time. Analysis may be done by simple microscopy or adapted for use with various software programs.*

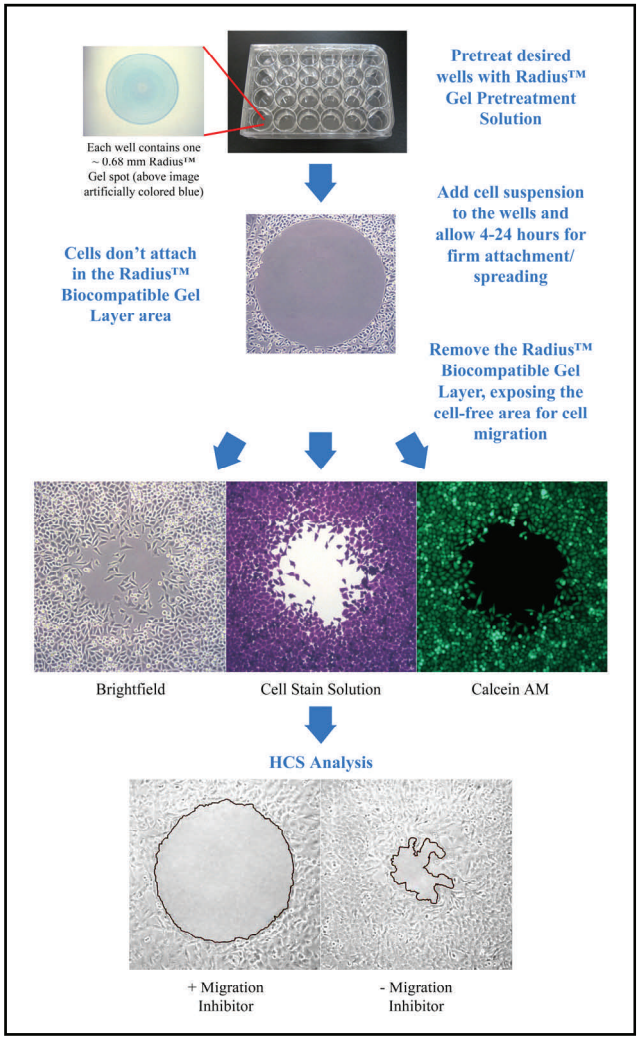
Radius™ Cell Migration Assays use a proprietary cell culture plate containing a carefully-defined biocompatible hydrogel spot centralized at the bottom of each well. When cells are seeded in the well, they will attach everywhere except on the Radius™ gel spot. This creates a cell free zone and a barrier to cell migration.

Once the cells are seeded on the Radius™ plate, a solution is added which removes the gel and allows the migration to begin. Cells migrate across the cell-free zone and close the gap.

Radius™ Cell Migration Assays can universally accommodate any cell size or type and are compatible with all cell stains, dyes and labels. Because of the simplicity of the gap closure format, Radius™ assays may be adapted to liquid handling equipment and high-content screening instrumentation.



Various Detection Methods with Radius™ Cell Migration Assays.



Radius™ Cell Migration Assay Principle.

*While we do not offer our own software program for quantitative analysis of data from Radius™ Cell Migration Assays, there are various programs available which may be used with our kits. We have customized an add-on for one of these programs to expedite analysis. For more information visit our website at www.cellbiolabs.com and type "Radius" in the search box.

Boyden Chamber Assays for Cell Migration and Invasion

Our CytoSelect™ Cell Migration and Cell Invasion Assays use a Boyden chamber consisting of polycarbonate inserts, uncoated or coated with ECM proteins, which are placed into a microplate (see Assay Principle, right). Cells are quantified using a standard colorimetric or fluorescence plate reader.

Chemotaxis Assays

Chemotaxis describes the migration of cells toward chemoatrractants in their surrounding environment. The CytoSelect™ Cell Migration Assays allow quantitation of chemotaxis in 24-well or 96-well plates. Assays are available in three different pore sizes to accommodate a variety of cell types.

Haptotaxis Assays

Haptotaxis describes the migration of cells toward chemoattractants in immobilized extracellular matrix. The CytoSelect™ Cell Haptotaxis Assays allow quantitation of haptotaxis in 24-well plates. The undersides of the inserts are coated with either Collagen I or Fibronectin; this coating serves as a barrier to separate migratory and non-migratory cells.

Transmigration Assays

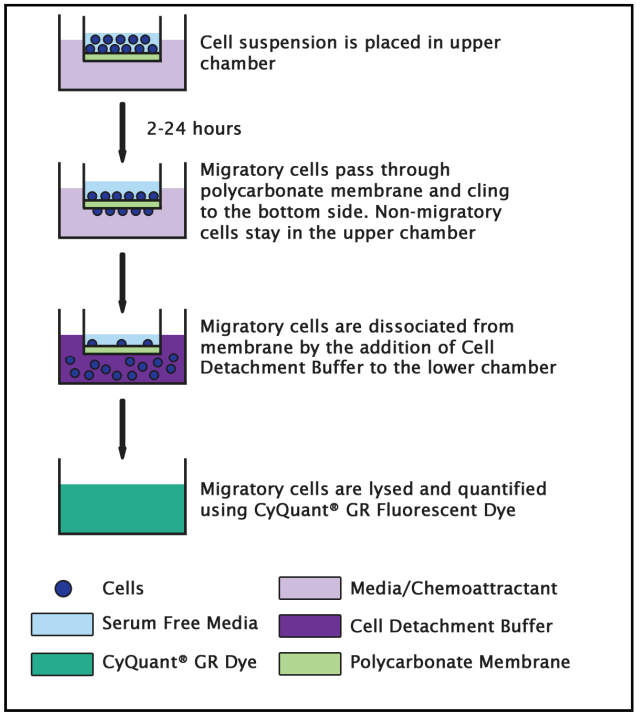
Transmigration describes the migration of cells through the vascular endothelium toward a chemoattractant. The CytoSelect™ Cell Transmigration Assays quantify these interactions in 24-well plates.

Invasion Assays

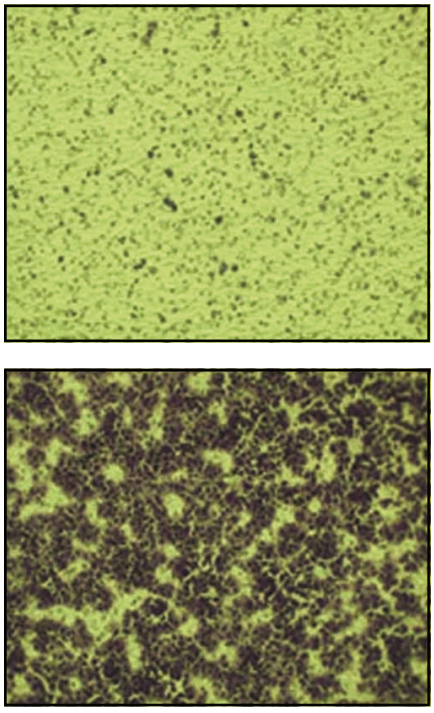
Invasion describes the ability of cells to degrade the surrounding extracellular matrix and invade surrounding tissues. The CytoSelect™ Cell Invasion Assays quantify invasive cells in 24-well or 96-well plates. Inserts are precoated on the top with either a basement membrane (ECM) matrix, Collagen I, or Laminin I.

Cell Migration / Invasion Combo Kits

If you're studying both the migratory and invasive properties of cells, save money with one of our CytoSelect™ Cell Migration / Invasion Combo Kits. Each kit contains one plate containing uncoated inserts for chemotaxis and one plate with inserts precoated with basement membrane (ECM protein matrix) for invasion. All inserts contain 8 µm pores.



Assay Principle for the CytoSelect™ Cell Migration Assays.



Migration of Human Fibrosarcoma HT-1080 Cells in the Absence (left) or Presence (right) of 10% FBS using the CytoSelect™ 24-Well Cell Migration Assay.

Selecting a Boyden Chamber Assay

Selection of the right Boyden Chamber Assay depends primarily on three criteria:

- What type of migration or invasion assay do you want to run? See previous page for definitions.
- Which cells you are studying?
- Does your plate reader have fluorescence (fluorometric) capability or does it only read optical density (colorimetric)?

Once you answer these questions, use the following table to choose your assay:

Boyden Chamber Assay Selection Guide

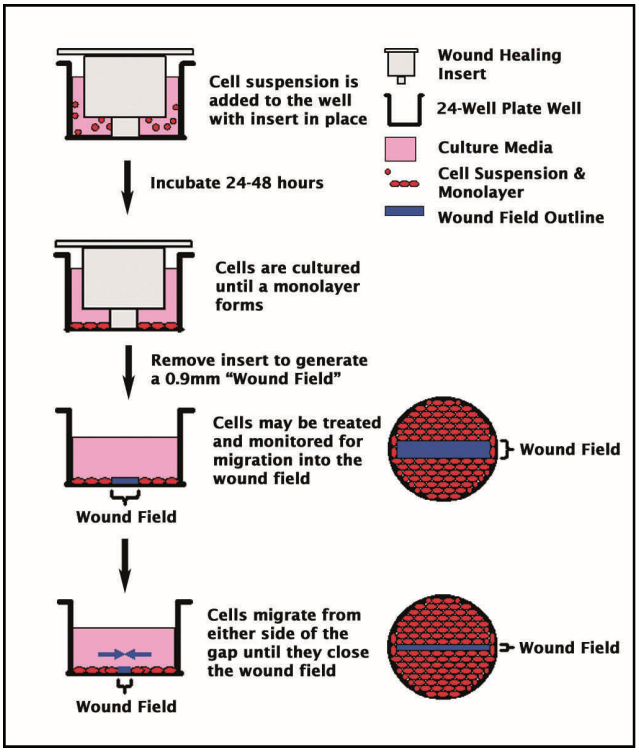
Assay	Cell Types	Insert Coating	Pore Size	Assay Format	Detection Method	Catalog Number
Chemotaxis	Fibroblasts, Endothelial Cells Epithelial Cells Tumor Cells	None	8 µm	24-Well	Colorimetric	CBA-100
					Fluorometric	CBA-101
				96-Well	Fluorometric	CBA-106
	Monocytes Macrophages	None	5 µm	24-Well	Fluorometric	CBA-102
				96-Well	Fluorometric	CBA-105
	Neutrophils & other Leukocytes	None	3 µm	24-Well	Fluorometric	CBA-103
				96-Well	Fluorometric	CBA-104
	Astrocytes Slow Moving Cells	None	12 µm	24-Well	Colorimetric	CBA-107
					Fluorometric	CBA-108
Haptotaxis	Fibroblasts, Endothelial Cells Epithelial Cells	Collagen I (bottom)	8 µm	24-Well	Colorimetric	CBA-100-COL
					Fluorometric	CBA-101-COL
		Fibronectin (bottom)	8 µm	24-Well	Colorimetric	CBA-100-FN
					Fluorometric	CBA-101-FN
Transmigration	Leukocytes	None	3 µm	24-Well	Fluorometric	CBA-212
	Tumor Cells	None	8 µm	24-Well	Fluorometric	CBA-216
Invasion	Fibroblasts, Endothelial Cells Epithelial Cells Tumor Cells	Basement Membrane Matrix (top)	8 µm	24-Well	Colorimetric	CBA-110
					Fluorometric	CBA-111
				96-Well	Fluorometric	CBA-112
		Collagen I (top)	8 µm	24-Well	Colorimetric	CBA-110-COL
					Fluorometric	CBA-111-COL
				96-Well	Fluorometric	CBA-112-COL
		Laminin I (top)	8 µm	24-Well	Colorimetric	CBA-110-LN
					Fluorometric	CBA-111-LN
				96-Well	Fluorometric	CBA-112-LN

More accurate and consistent than homemade scratch assays

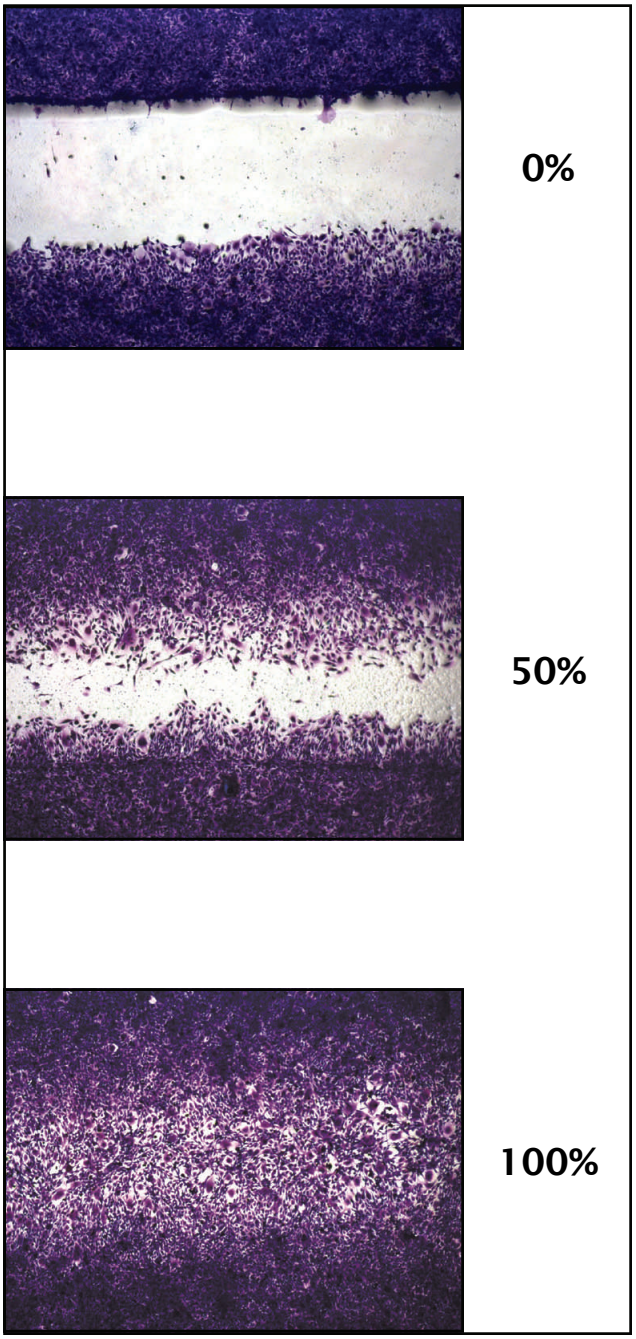
Wound Healing Assay

Wound healing assays are useful for studying tissue matrix remodeling, regulation of cytoskeletal structure, and cell proliferation and migration rates of different cells and culture conditions. Traditional wound healing assays are performed by making a scratch across a confluent cell monolayer to create an open gap, mimicking a "wound". Such scratch assays, however, lack a consistently defined wound area and result in high inter-sample variation.

Our CytoSelect™ 24-Well Wound Healing Assay provides a more consistent method to measure cell migration across an *in vitro* "wound field" gap. Proprietary inserts generate a consistently defined 0.9mm gap between the cells. Cells can then be treated and monitored for proliferation or migration across the wound field by time-lapse microscopy or imaging samples at fixed time points.



Assay Principle for the CytoSelect™ 24-Well Wound Healing Assay.



Percent Wound Closure of STO Cells at Various Time Points using the CytoSelect™ 24-Well Wound Healing Assay.

Ordering Information and Published Citations

48-Well ECM Cell Adhesion Assays

Product Name	Detection	Size / Qty	Catalog Number
CytoSelect™ 48-Well Cell Adhesion Assay, ECM Array (Contains one row each of Collagen I, Collagen IV, Fibrinogen, Fibronectin, and Laminin)	Colorimetric	48 Assays	CBA-070
		5 x 48 Assays	CBA-070-5
	Fluorometric	48 Assays	CBA-071
		5 x 48 Assays	CBA-071-5
CytoSelect™ 48-Well Cell Adhesion Assay, Collagen I	Colorimetric	48 Assays	CBA-052
	Fluorometric	48 Assays	CBA-053
CytoSelect™ 48-Well Cell Adhesion Assay, Collagen IV	Colorimetric	48 Assays	CBA-060
	Fluorometric	48 Assays	CBA-061
CytoSelect™ 48-Well Cell Adhesion Assay, Fibrinogen	Colorimetric	48 Assays	CBA-058
	Fluorometric	48 Assays	CBA-059
CytoSelect™ 48-Well Cell Adhesion Assay, Fibronectin	Colorimetric	48 Assays	CBA-050
	Fluorometric	48 Assays	CBA-051
CytoSelect™ 48-Well Cell Adhesion Assay, Laminin	Colorimetric	48 Assays	CBA-056
	Fluorometric	48 Assays	CBA-057

Recent Product Citations

1. Cervera, A.M. et al (2008). Cells silenced for SDHB expression display characteristic features of the tumor phenotype. *Cancer Res.* **68**:4058-4067. (CBA-050 and CBA-070)
2. Lee, J. et al. (2013). Selective inhibition of prostaglandin E2 receptors EP2 and EP4 inhibits adhesion of human endometriotic epithelial and stromal cells through suppression of integrin-mediated mechanisms. *Biol. Reprod*. **88**:77. (CBA-057)
3. Miao, H. et al. (2008). Gene expression and functional studies of the optic nerve head astrocyte transcriptome from normal African Americans and Caucasian Americans donors. *PLoS One* **3(8)**:E2847. (CBA-060)
4. Xing, C. et al. (2013). Reversing effect of ring finger protein 43 inhibition on malignant phenotypes of human hepatocellular carcinoma. *Mol. Cancer Ther.* **12**:94-103. (CBA-070)
5. Mei, J. et al. (2012). Inhibition of IDO1 suppresses cyclooxygenase-2 and matrix metalloporeinase-9 expression and decreases proliferation, adhesion and invasion of endometrial stromal cells. *Mol. Human Reprod.* 10.1093/molehr/gas021. (CBA-070)
6. Kandalam, V. et al. (2011). Lack of tissue inhibitor of metalloproteinases 2 leads to exacerbated left ventricular dysfunction and adverse extracellular matrix remodeling in response to biomechanical stress. *Circulation* **124**:2094-2105. (CBA-070)
7. Kim, S.W. et al. (2013). Cardiac stem cells with electrical stimulation improve ischaemic heart function through regulation of connective tissue growth factor and miR-378. *Cardiovasc. Res.* 10.1093/cvr/cvt192. (CBA-071)

96-Well Endothelium & Epithelium Adhesion Assays

Product Name	Detection	Size / Qty	Catalog Number
CytoSelect™ 96-Well Leukocyte-Endothelium Adhesion Assay	Fluorometric	96 Assays	CBA-210
CytoSelect™ 96-Well Leukocyte-Epithelium Adhesion Assay	Fluorometric	96 Assays	CBA-211
CytoSelect™ 96-Well Tumor-Endothelium Adhesion Assay	Fluorometric	96 Assays	CBA-215

Recent Product Citations

1. Liu, G. et al. (2012). ICAM-1-activated Src and eNOS signaling increase endothelial cell surface PECAM-1 adhesivity and neutrophil transmigration. *Blood* **120**:1942-1952. (CBA-210)
2. Fang, Y. et al. (2012). Site-specific microRNA-92a regulation of Kruppel-like factors 4 and 2 in atherosusceptible endothelium. *Arterioscler. Thromb. Vasc. Biol.* **32**:979-987. (CBA-210)
3. Curatola, A.M. et al. (2012). Dehydroepiandrosterone (DHEA) inhibition of monocyte binding by vascular endothelium is associated with sialylation of neural cell adhesion of neural cell adhesion molecule. *Repr. Sciences* **19**:86-91. (CBA-210)
4. Wang, Y.L. et al. (2011). Innate immune function of the adherens junction protein p120-catenin in endothelial response to endotoxin. *J. Immunol.* **186**:3180-3187. (CBA-210)
5. Xue, J. et al. (2009). NFkB regulates thrombin-induced ICAM-1 gene expression in cooperation with NFAT by binding to the intronic NFkB site in the ICAM-1 gene. *Physiol. Genomics* **38**:42-53. (CBA-210)
6. Ziemann, A. et al. (2013). CRN2 enhances the invasiveness of glioblastoma cells. *Neuro Oncology* 10.1093/neuonc/nos388. (CBA-215)
7. Hernandez, L. et al. (2010). Activation of NF-kB signaling by inhibitor of NF-kB Kinase ß increases aggressiveness of ovarian cancer. *Cancer Res.* **70**:4005-4014. (CBA-215)
8. Gu, L. et al. (2010). Stat5 promotes metastatic behavior of human prostate cancer cells in vitro and in vivo. *Endocr. Relat. Cancer* **17**:481-493. (CBA-215)

Ordering Information and Published Citations

2D Gap Closure Cell Migration Assays

Product Name	Detection	Size / Qty	Catalog Number
Radius™ 24-Well Cell Migration Assay	Microscopy	24 Assays	CBA-125
		5 x 24 Assays	CBA-125-5
Radius™ 24-Well Cell Migration Assay (Collagen I Coated)	Microscopy	24 Assays	CBA-125-COL
Radius™ 24-Well Cell Migration Assay (ECM Array Coated)	Microscopy	24 Assays	CBA-125-ECM
Radius™ 24-Well Cell Migration Assay (Fibronectin Coated)	Microscopy	24 Assays	CBA-125-FN
Radius™ 24-Well Cell Migration Assay (Laminin Coated)	Microscopy	24 Assays	CBA-125-LN
Radius™ 96-Well Cell Migration Assay	Microscopy	96 Assays	CBA-126
		5 x 96 Assays	CBA-126-5
Radius™ 384-Well Cell Migration Assay	Microscopy	384 Assays	CBA-127
		5 x 384 Assays	CBA-127-5

Recent Product Citations

1. Sun, J. et al. (2013). Targeting the metastasis suppressor, NDRG1, using novel iron chelators: regulation of stress fiber-mediated tumor cell migration via modulation of the ROCK1/pMLC2 signaling pathway. *Mol. Pharmacol.* **83**:454-469. (CBA-125)
2. Apostolos, K. et al. (2013). Increased susceptibility of melanin-concentrating hormone-deficient mice to infection with Salmonella enterica serovar Typhimurium. *Infect. Immun.* **81**:128166-172. (CBA-125)
3. Smith, K. et al. (2012). Human family with sequence similarity 60 member A (FAM60A) protein: a new subunit of the Sin3 deacetylase complex. *Mol. Cell Proteomics* **11**:1815-1828. (CBA-125)
4. Young, S. et al. (2012). Rapid protein kinase D1 signaling promotes migration of intestinal epithelial cells. *Am. J. Physiol. Gastrointest. Liver Physiol.* **303**:G356-G366. (CBA-125)
5. Larive, R.M. et al. (2012). The Ras-like protein R-Ras2/TC21 is important for proper mammary gland development. *Mol. Biol. Cell* **23**:2373-2387. (CBA-125)
6. Chuang, T.D. et al. (2012). miR-93/106b and their host gene, MCM7, are differentially expressed in leiomyomas and functionally target F3 and IL-8. *Mol. Endocrin.* **26**:1028-1042. (CBA-125)
7. Wong, B. et al. (2013). Adrenomedullin enhances invasion of human extravillous cytotrophoblast-derived cell lines by regulation of urokinase plasminogen activator expression and S-nitrosylation. *Biol. Reprod.* **88**:34. (CBA-126)
8. Ichikawa, A. et al. (2013). CXCL10-CXCR3 enhances the development of neutrophil-mediated fulminant lung injury of viral and nonviral origin. *Am. J. Respir. Crit. Care Med.* **187**:65-77. (CBA-126)
9. Coulouarn, C. et al. (2012). Hepatocyte-stellate cell cross-talk in the liver engenders a permissive inflammatory microenvironment that drives progression in hepatocellular carcinoma. *Cancer Res.* **72**:2533-2542. (CBA-126)

Boyden Chamber Chemotaxis Assays, 96-Well

Product Name	Detection	Size / Qty	Catalog Number
CytoSelect™ 96-Well Cell Migration Assay, 8 µm pore	Fluorometric	96 Assays	CBA-106
		5 x 96 Assays	CBA-106-5
CytoSelect™ 96-Well Cell Migration Assay, 5 µm pore	Fluorometric	96 Assays	CBA-105
		5 x 96 Assays	CBA-105-5
CytoSelect™ 96-Well Cell Migration Assay, 3 µm pore	Fluorometric	96 Assays	CBA-104
		5 x 96 Assays	CBA-104-5

Recent Product Citations

1. Li, X. et al. (2011). Kaposi's sarcoma-associated Herpesvirus-encoded latency-associated nuclear antigen recduces interleukin-8 expression in endothelial cells and impairs neutrophil chemotaxis by degrading nuclear p65. *J. Virol.* **85**:8606-8615. (CBA-104)
2. Chatterjee, S. et al. (2009). Site specific carboxypeptidase B1 tyrosine nitration and pathophysiological implications following its physical association with nitric oxide synthase-3 in experimental sepsis. *J. Immunol.* **183**:4055-4066. (CBA-104)
3. Jun, H.S. et al. (2012). Glucose-6-phosphatase-ß, implicated in a congenital neutropenia syndrome, is essential for macrophage energy homeostasis and functionality. *Blood* **119**:4047-4055. (CBA-105)
4. Christophi, G. et al. (2008). Modulation of macrophage infiltration and inflammatory activity by the phosphatase SHP-1 in virus-induced demyelinating disease. *J. Virol.* **83**:522-539. (CBA-105)
5. Rosenblum, S. et al. (2012). Timing of intra-arterial neural stem cell transplantation after hypoxia-ischemia influences cell engraftment, survival, and differentiation. *Stroke* **43**:1624-1631. (CBA-106)
6. Aftab, B.T. et al. (2011). Itraconazole inhibits angiogenesis and tumor growth in non-small cell lung cancer. *Cancer Res.* **71**:6764-6772. (CBA-106)
7. Saher, H. et al. (2010). Red wine consumption improves in vitro migration of endothelial progenitor cells in young, healthy individuals. *Am. J. Clinical Nutrition* **92**:161-169. (CBA-106)

Ordering Information and Published Citations

Boyden Chamber Chemotaxis Assays

Product Name	Detection	Size / Qty	Catalog Number
CytoSelect™ 24-Well Cell Migration Assay, 8 µm pore	Colorimetric	12 Assays	CBA-100
		5 x 12 Assays	CBA-100-5
	Fluorometric	12 Assays	CBA-101
		5 x 12 Assays	CBA-101-5
CytoSelect™ 24-Well Cell Migration Assay, 5 µm pore	Fluorometric	12 Assays	CBA-102
		5 x 12 Assays	CBA-102-5
CytoSelect™ 24-Well Cell Migration Assay, 3 µm pore	Fluorometric	12 Assays	CBA-103
		5 x 12 Assays	CBA-103-5
CytoSelect™ 24-Well Cell Migration Assay, 12 µm pore	Colorimetric	12 Assays	CBA-107
	Fluorometric	12 Assays	CBA-108

Recent Product Citations

1. Al-Wadei, M.H. et al. (2013). Gamma-amino butyric acid (GABA) prevents the induction of nicotinic receptor-reuglated signaling by chronic ethanol in pancreatic cancer cells and normal duct epithelia. *Cancer Prev. Res.* **6**:139-148. (CBA-100)
2. Chen, Z. et al. (2012). The iron chelators Cp44mT and DFO inhibit TGF-ß-induced epithelial-mesenchymal transition via up-regulation of N-Myc downstream-regulated gene 1 (NDRG1). *J. Biol. Chem.* **287**:17016-17028. (CBA-100)
3. Tabata, C. et al. (2010). Novel clinical role of angiopoietin-1 in malignant pleural mesothelioma. *Eur. Resp. J.* 10.1183/09031936.00154009. (CBA-100)
4. Izhak, L. et al. (2010). Predominant expression of CCL2 at the tumor site of prostate cancer patients directs a selective loss of immunological tolerance to CCL2 that could be amplified in a beneficial manner. *J. Immunol.* **184**:1092-1101. (CBA-101)
5. Kiss, J. et al. (2012). Loss of the oxygen sensor PHD3 enhances the innate immune response to abdominal sepsis. *J. Immunol.* **189**:1955-1965. (CBA-102)
6. Shynlova, O. et al. (2008). Monocyte chemoattractant protein-1 (CCL2) integrates mechanical and endocrine signals that mediate term and preterm labor. *J. Immunol.* **181**:1470-1479. (CBA-102)
7. Verma, S. et al. (2011). Selenoprotein K knockout mice exhibit deficient calcium flux in immune cells and impaired immune responses. *J. Immunol.* **186**:2127-2137. (CBA-103)

Boyden Chamber Cell Haptotaxis Assays

Product Name	Detection	Size / Qty	Catalog Number
CytoSelect™ 24-Well Cell Haptotaxis Assay, Collagen I-coated	Colorimetric	12 Assays	CBA-100-COL
	Fluorometric	12 Assays	CBA-100-FN
CytoSelect™ 24-Well Cell Haptotaxis Assay, Fibronectin-coated	Colorimetric	12 Assays	CBA-101-COL
	Fluorometric	12 Assays	CBA-101-FN

Recent Product Citations

1. Herrera, I. et al. (2013). Matrix metalloproteinase (MMP)-1 induces lung alveolar epithelial cell migration and proliferation, protects from apoptosis, and represses mitochondrial oxygen consumption. *J. Biol. Chem.* **288**:25964-25975. (CBA-100-COL)
2. Niccoli, S. et al. (2012). The Asian-American E6 variant protein of human papillomavirus 16 alone is sufficient to promote immortalization, transformation, and migration of primary human foreskin keratinocytes. *J. Virol.* **86**:12384-12396. (CBA-110-COL)
3. Kamiya, K. et al. (2007). Protein Kinase C delta activated adhesion regulates vascular smooth muscle cell migration. *J. Surg. Res.* **141**:91-96. (CBA-100-COL)

Boyden Chamber Cell Transmigration Assays

Product Name	Detection	Size / Qty	Catalog Number
CytoSelect™ Leukocyte Transmigration Assay	Fluorometric	24 Assays	CBA-212
CytoSelect™ Tumor Transendothelial Migration Assay	Fluorometric	24 Assays	CBA-216

Recent Product Citations

1. Fava, G. et al. (2008). Leptin enhances cholangiocarcinoma cell growth. *Cancer Res.* **68**:6752-6761. (CBA-212)
2. Zhao, L. et al. (2008). CD44 expressed on both bone marrow-derived and non-bone marrow-derived cells promotes atherogenesis in ApoE-deficient mice. *Arterioscler. Thromb. Vasc. Biol.* **28**:1283-1289. (CBA-212)
3. Xu, Z. et al. (2010). Role of pancreatic stellate cells in pancreatic cancer metastasis. *Am. J. Pathol.* **177**:2585-2596. (CBA-216)
4. Yang, H. and H.E. Grossniklaus (2010). Constitutive overexpression of pigment epithelium derived factor inhibition of ocular melanoma growth and metastasis. *Invest. Ophthalmol. Vis. Sci.* **51**:28-34. (CBA-216)
5. Liu, K. et al. (2007). Lentivirus mediated gene transfer of PEDF results in decreased uveal melanoma transendothelial migration. *Invest. Opthalmol. Vis. Sci.* **48**:5244. (CBA-216)

Ordering Information and Published Citations

Boyden Chamber Cell Invasion Assays

Product Name	Detection	Size / Qty	Catalog Number
CytoSelect™ 24-Well Cell Invasion Assay, Basement Membrane	Colorimetric	12 Assays	CBA-110
	Fluorometric	12 Assays	CBA-111
CytoSelect™ 24-Well Cell Invasion Assay, Collagen I	Colorimetric	12 Assays	CBA-110-COL
	Fluorometric	12 Assays	CBA-111-COL
CytoSelect™ 24-Well Cell Invasion Assay, Laminin I	Colorimetric	12 Assays	CBA-110-LN
	Fluorometric	12 Assays	CBA-111-LN
CytoSelect™ 96-Well Cell Invasion Assay, Basement Membrane	Fluorometric	96 Assays	CBA-112
CytoSelect™ 96-Well Cell Invasion Assay, Collagen I	Fluorometric	96 Assays	CBA-112-COL
CytoSelect™ 96-Well Cell Invasion Assay, Laminin I	Fluorometric	96 Assays	CBA-112-LN

Recent Product Citations

1. Gradilone, S. et al. (2013). HDAC6 inhibition restores ciliary expression and decreases tumor growth. *Cancer Res.* **73**:2259-2270. (CBA-110)
2. Nam, H. et al. (2013). Antitumor activity of saracatinib (AZD0530), a c-Src/Abl kincase inhibitor, alone or in combination with chemotherapeutic agents in gastric cancer. *Mol. Cancer Ther.* **12**:16-26. (CBA-110)
3. DiNatale, B. et al. (2012). Ah receptor antagonism represses head and neck tumor cell aggressive phenotype. *Mol. Cancer Res.* **10**:1369-1379. (CBA-110)
4. Citterio, C. et al (2012). The Rho exchange factors Vav2 and Vav3 control a lung metastasis-specific transcriptional program in breast cancer cells. *Sci. Signal.* **5**:ra71. (CBA-110)
5. Nakayama, K. et al. (2013). cAMP-response element-binding protein (CREB) and NFkB transcription factors are activated during prolonged hypoxia and cooperatively regulate the induction of matrix metalloproteinase MMP1. *J. Biol. Chem.* **288**:2584-22595. (CBA-112)
6. Desai, S.D. et al. (2012). ISG15 disrupts cytoskeletal architecture and promotes motility in human breast cancer cells. *Exp. Biol. Med.* **237**:38-49. (CBA-112)
7. Ziemann, A. et al. (2013). CRN2 enhances the invasiveness of gliobastoma cells. *Neuro Oncology* 10.1093/neuonc/nos388. (CBA-112-COL)
8. Liu, X. et al. (2013). Antiproliferative, antiinvasive, and proapoptotic activity of folate receptor alpha-targeted liposomal doxorubicin in nonfunctional pituitary adenoma cells. *Endocrinology* **154**:1414-1423. (CBA-112-COL)

Boyden Chamber Cell Migration / Invasion Assay Combo Kits

Product Name	Detection	Size / Qty	Catalog Number
CytoSelect™ 24-Well Cell Migration / Invasion Combo Kit, 8 µm pore	Colorimetric	2 x 12 Assays	CBA-100-C
	Fluorometric	2 x 12 Assays	CBA-101-C
CytoSelect™ 96-Well Cell Migration / Invasion Combo Kit, 8 µm pore	Fluorometric	2 x 96 Assays	CBA-106-C

Recent Product Citations

1. Majid, S. et al. (2013). miRNA-34b inhibits prostate cancer through demethylation, active chromatin modification, and AKR pathways. *Clin. Cancer Res.* **19**:73-84. (CBA-100-C)
2. Shin, S.Y. et al. (2010). TNF alpha-exposed bone marrow-derived mesenchymal stem cells promote locomotion of MDA-MB-231 breast cancer cells through transcriptional activation of CXCR3 ligand chemokines. *J. Biol. Chem.* **285**:30731-30740. (CBA-100-C)
3. Uddin, M. et al. (2008). Marinobufagenin inhibits proliferation and migration of cytotrophoblast and CHO cells. *Placenta* **29(3):**266-273. (CBA-101-C)
4. Gobeil, S. et al. (2008). A genome wide shRNA screen identifies GAS1 as a novel melanoma metastasis suppressor gene. *Genes Dev.* **22 (21):**2932-2940. (CBA-101-C)
5. Axlund, S.D. et al. (2010). HOXC8 inhibits androgen receptor signaling in human prostate cancer cells by inhibiting SRC-3 recruitment to direct androgen target genes. *Mol. Cancer Res.* **8**:1643-1655. (CBA-106-C)
6. Alfano, R.W. et al. (2009). Matrix metalloproteinase-activated anthrax lethal toxin inhibits endothelial invasion and neovasculature formation during in vitro morphogenesis. *Mol. Cancer Res.* **7**:452-461. (CBA-106-C)

Wound Healing Assays

Product Name	Detection	Size / Qty	Catalog Number
CytoSelect™ 24-Well Wound Healing Assay	Light Microscopy	24 Assays	CBA-120
		5 x 24 Assays	CBA-120-5

Recent Product Citations

1. Cui, X.G. et al. (2013). Response gene to complement 32 deficiency causes impaired placental angiogenesis in mice. *Cardiovasc. Res.* 10.1093/cvr/cvt121.
2. Gutschner, T. et al. (2013). The noncoding RNA MALAT1 is a critical regulator of the metastasis phenotype of lung cancer cells. *Cancer Res.* **73**:1180-1189.
3. Xing, C. et al. (2013). Reversing effect of ring finger protein 43 inhibition on malignant phenotypes of human hepatocellular carcinoma. *Mol. Cancer Ther.* **12**:94-103.

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